

REMARKS

Claims 1 and 3 are in the application, of which both are independent claims and are currently amended. Claims 2 and 4-6 are herein canceled without prejudice or disclaimer. Reconsideration and further examination are respectfully requested.

No new matter is believed to have been introduced to the application by this amendment. The changes to the claims are fully supported by the original disclosure, including, for example, original paragraphs [0032] to [0034], and original claims 2 and 4-6.

Claim Rejections – 35 USC § 103

Claims 1 and 2 were rejected under 35 USC § 103 over Japanese Patent No. 62-173,142 (Masahito) in view of Japanese Patent No. 5-200,626 (Shichizawa). Claims 3 and 4 were rejected under 35 USC § 103 over Masahito in view of Japanese Patent No. 1-289,624 (Shoji). Claim 5 was rejected under 35 USC § 103 over U. S. Patent No. 5,693,240 (Magara) in view of U. S. Patent No. 4,361,745 (Rupert), Masahito, and Shichizawa. Claim 6 was rejected under 35 USC § 103 over Magara in view of Rupert, Masahito, and Shoji. Reconsideration and withdrawal of these rejections are respectfully requested.

Claims 2, 4, 5, and 6 are canceled herein, making the rejection of these claims moot.

As to claims 1 and 3, Applicants respectfully assert that the present Office Action fails to establish a prima facie case of obviousness. A proper obviousness rejection requires all of the claim limitations to be considered. MPEP § 2143.03 provides guidance, stating that “[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

The present Office Action asserts that all of Applicants’ claim limitations for claims 1 and 3 are found in the English-language Abstract of Japanese Patent No. 62-173142 (Masahito), except for (as to claim 1) completing electric discharge machining when the machining time (T) has elapsed from the start of electric discharge machining, and except for (as to claim 3)

completing electric discharge machining when a number of discharges have been completed from the start of the machining. Applicants respectfully assert that all of the claim limitations for claims 1 and 3 are not considered in that the claim limitations, while asserted as being disclosed in Masahito's Abstract, are not so disclosed.

The English-language Abstract for Masahito states that "[f]orm data such as a projected area and a side area of a machining part, volume, machining depth, electrode size reduced value, surface roughness, etc., are inputted from a work part drawing at a form data input part . . . and machining time is outputted while referring to the stored contents of a data memory part . . . for time estimation This time estimating processing part . . . is provided with a machining form judging part judging a machine form from the form data inputted, an electric condition series selection part selecting an electric condition series to be used for electric discharge machining, a removal amount calculating part calculating a removal amount from electric conditions and form data, a current density calculating part calculating current density at every electric condition and an erosion rate calculating part." Masahito's English-language Abstract states that its purpose is to improve estimation accuracy in machining time.

The applied references are not understood to disclose or suggest the features of claim 1, particularly with respect to at least the following features:

- setting a dimension of material to be removed (d);
- obtaining a removal volume (V) corresponding to a volume of material to be removed from a workpiece based on the removal surface area (S) and the dimension of material to be removed (d);
- determining a machining time (T) based on the removal volume (V) and the removal volume rate (Vm); and
- completing electric discharge machining of the workpiece when the machining time (T) has elapsed from the start of electric discharge machining.

At least these features are neither disclosed nor suggested by Masahito or Shichizawa, whether alone or in combination.

Masahito relates to a machining time estimator for electric discharge machining. Specifically, Masahito relates to a machining time calculation unit that estimates a machining time for process control. While Masahito's machining time calculation unit estimates a machining time, the machining time is only used as a guide for process control. In other words, Masahito merely discloses a guide for its machining time, whereas Applicants' claim 1 recites the feature of completing electric discharge machining of the workpiece when the machining time has elapsed. In Masahito's device, an operator cannot complete electric discharge machining using Masahito's estimated machining time because the estimate is merely a guide.

Moreover, the Office Action (at page 2) states that all of the limitations of Applicants' claim 1 can be found in Masahito's English-language Abstract (except for completing electric discharge machining when the machining time (T) has elapsed from the start of electric discharge machining). However, Masahito's English-language Abstract is not seen to disclose or suggest the following features: setting a dimension of material to be removed (d); obtaining a removal volume (V) corresponding to a volume of material to be removed from a workpiece based on the removal surface area (S) and the dimension of material to be removed (d); determining a machining time (T) based on the removal volume (V) and the removal volume rate (Vm); and completing electric discharge machining of the workpiece when the machining time (T) has elapsed from the start of electric discharge machining. Masahito is therefore seen to be deficient.

Shichizawa is seen as failing to cure Masahito's deficiencies. Shichizawa relates to an electric discharge machining apparatus for "surface finishing." Shichizawa's "surface finishing" can hardly remove material from a workpiece and simply decreases a rough surface in a cavity of a workpiece to a desired value. Shichizawa is not concerned with the removal of material or a removal volume, and is merely concerned with surface roughness. Thus, Shichizawa is not seen

to disclose or suggest the following features: setting a dimension of material to be removed (d); obtaining a removal volume (V) corresponding to a volume of material to be removed from a workpiece based on the removal surface area (S) and the dimension of material to be removed (d); determining a machining time (T) based on the removal volume (V) and the removal volume rate (Vm); and completing electric discharge machining of the workpiece when the machining time (T) has elapsed from the start of electric discharge machining. Masahito is therefore seen to be deficient.

In addition, one skilled in the art would not be motivated to combine Shichizawa that is not concerned with the removal of material with Masahito for the purpose of removing materials.

Accordingly, the applied references, either alone or in combination, are not understood to disclose, teach, or suggest the features of independent claim 1, which is therefore believed to be in condition for allowance.

Turning now to the rejection of claim 3, the applied references are not understood to disclose or suggest the features of claim 3, particularly with respect to at least the following features:

- setting a dimension of material to be removed (d);
- obtaining a removal volume (V) corresponding to a volume of material to be removed from a workpiece based on the removal surface area (S) and the dimension of material to be removed (d);
- determining a number of electric discharges (P) based on the removal volume (V) and the removal volume per single discharge (Vp); and
- completing electric discharge machining of the workpiece when the number of electric discharges (P) have been completed from the start of electric discharge machining.

At least these features are neither disclosed nor suggested by Masahito or Shoji, whether alone or in combination.

The Office Action (at page 3) states that all of the limitations of Applicants' claim 3 can be found in Masahito's English-language Abstract (except for completing electric discharge machining when the number of discharges have been completed from the start of machining). However, Masahito's English-language Abstract is not seen to disclose or suggest the following features: setting a dimension of material to be removed (d); obtaining a removal volume (V) corresponding to a volume of material to be removed from a workpiece based on the removal surface area (S) and the dimension of material to be removed (d); determining a number of electric discharges (P) based on the removal volume (V) and the removal volume per single discharge (V_p); and completing electric discharge machining of the workpiece when the number of electric discharges (P) have been completed from the start of electric discharge machining.

Shoji is seen as failing to cure Masahito's deficiencies. Shoji relates to a finishing controller for electrospark machining. In Shoji's apparatus, a tool electrode is vertically advanced into a workpiece with a pre-cut cavity. When the tool electrode reaches a predetermined feed amount or depth into the cavity, the advance into the workpiece may be halted. Shoji proposes that an operator should set a particular number of discharges of the tool electrode to finish the surface processing of the cavity. In the present invention, an operator does not set the number of electric discharges. An operator merely needs to set a dimension of material to be removed, and a number of electric discharges (P) is determined based on a removal volume (V) which is based on the dimension of material to be removed.

Shoji is therefore merely seen as applying surface finishing using a number of discharges set by an operator, and is not seen to disclose or suggest the following features: setting a dimension of material to be removed (d); obtaining a removal volume (V) corresponding to a volume of material to be removed from a workpiece based on the removal surface area (S) and the dimension of material to be removed (d); determining a number of electric discharges (P)

based on the removal volume (V) and the removal volume per single discharge (Vp); and completing electric discharge machining of the workpiece when the number of electric discharges (P) have been completed from the start of electric discharge machining. Shoji is therefore seen as failing to cure Masahito's deficiencies.

Accordingly, the applied references, either alone or in combination, are not understood to disclose, teach, or suggest the features of independent claim 3, which is therefore believed to be in condition for allowance.

In addition, none of the other references is seen to compensate for the deficiencies of Masahito, Shichizawa or Shoji. In particular, none of the other references is seen to disclose or suggest the features of claim 1 or claim 3.

Conclusion

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience. Applicant's undersigned attorney may be contacted at the address and telephone number set forth below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 502203 and please credit any excess fees to such deposit account.

Respectfully submitted,

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